

## II. AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions, and listings, of claims in the application:

1. (Currently Amended) An authentication method for a distributed data processing environment in which a server data processing system has access to a repository storing cipher-protected client passwords, the cipher-protected client passwords having been generated by applying a cipher function to the client passwords, the method comprising:

    a process at the client data processing system applying the cipher function to the client password which corresponds to the stored cipher-protected client password, thereby to generate a cipher-protected client password which is equivalent to the stored cipher-protected client password;

    performing an authentication check using the client data processing system's cipher-protected client password and the server data processing system's stored cipher-protected client password as a shared secret for said authentication check,

    wherein the authentication check is adapted to be performed without having the client password in a cleartext format on the server data processing system, and

wherein the authentication method is adapted to function without additional software infrastructure.

2. (Original) A method according to claim 1, wherein the authentication check includes performing a mutual challenge-response authentication protocol check.

3. (Currently Amended) A method according to claim 1, wherein the cipher function is an encryption algorithm and wherein the cipher-protected client password comprises a salt and a character string.

4. (Previously Presented) A method according to claim 3, wherein the authentication check comprises generating a common secret session key at both the client and server data processing systems using the cipher-protected client password generated at the client with the encryption algorithm and the stored cipher-protected client password at the server that is encrypted with the encryption algorithm and using this common secret session key in a mutual challenge-response authentication protocol.
5. (Original) A method according to claim 4, wherein the common secret session key is generated by applying a cipher function to each of the generated encrypted client password at the client and the stored encrypted client password at the server.
6. (Original) A method according to claim 1, wherein the cipher function is a hash function.
7. (Original) A method according to claim 1, wherein each cipher-protected client password stored in the repository is stored together with a respective token, and the cipher-protected client passwords are generated by combining the client passwords with the respective token and applying the cipher function to the combination, and wherein the method includes:
  - a process at the server data processing system retrieving from the repository the respective token for a stored cipher-protected client password, and transmitting the token to a client data processing system; and
  - the process at the client data processing system applying the cipher function to the combination of the transmitted token and the client password which corresponds to the stored cipher-protected client password, thereby to generate the equivalent cipher-protected client password for use as a shared secret.
8. (Original) A method according to claim 7, wherein the token is a random number.
9. (Original) A method according to claim 1, wherein the server data processing system's password repository is preferably integrated within the operating system of the server data processing system.

10. (Currently Amended) A method according to claim 9, wherein the operating system is an operating system conforming to the UNIX operating system standard or derived from a UNIX conforming operating system.

11. (Original) A method according to claim 10, wherein the encryption algorithm is provided by the UNIX crypt() function.

12. (Currently Amended) An authentication method for a distributed data processing environment in which a server data processing system has access to a repository storing cipher-protected client passwords, each cipher-protected client password being stored together with a respective token, the cipher-protected client passwords having been generated by combining the client passwords with the respective token and applying a cipher function to the combination, the method comprising:

a process at the server data processing system retrieving from the repository the respective token for a stored cipher-protected client password, and transmitting the token to a client data processing system;

a process at the client data processing system applying the cipher function to the combination of the transmitted token and the client password which corresponds to the stored cipher-protected client password, thereby to generate a cipher-protected client password which is equivalent to the stored cipher-protected client password; and

using the client data processing system's cipher-protected client password and the server data processing system's stored cipher-protected client password as a shared secret for a mutual challenge-response authentication check,

wherein the authentication method is adapted to be performed without having the client password in a cleartext format on the server data processing system, and

wherein the authentication method is adapted to function without additional software infrastructure.

13. (Currently Amended) A computer program product comprising program code recorded on a machine-readable recording medium, wherein the program code includes a server process for participating in a mutual challenge-response authentication protocol, the server process having access to a repository storing a cipher-protected copy of client passwords, the cipher protected client passwords having been generated by applying a first cipher function to the client passwords, the server process comprising:

means, responsive to a client process indicating a requirement for an operation to be performed, for generating a server challenge and for transmitting the server challenge to the client process, thereby to enable the client process:

(i) to generate a cipher-protected client password by applying said first cipher function to the client's password, thereby to provide the client and server processes with a shared secret; and then

(ii) to generate a client response and counter-challenge, the client response and counter-challenge including a message authentication code computed using the cipher-protected client password, and to forward it to the server process;

means for receiving the client response and counter-challenge from the client process;

means for accessing the repository and retrieving said stored cipher-protected client password;

means for generating, using said stored cipher-protected client password, a message authentication code corresponding to an anticipated client response and counter-challenge, and for comparing the received and generated message authentication codes to determine whether they match;

means, responsive to a match, for generating a server response to the client response and counter-challenge; and

means for forwarding the server response to the client process to enable the client process to perform an authentication check,

wherein the server process for participating in a mutual challenge-response authentication protocol is adapted to be performed without having the client password in a cleartext format on the server data processing system, and

wherein the program product is adapted to function without additional software infrastructure.

14. (Currently Amended) A computer program product, comprising program code recorded on a machine-readable recording medium, wherein the program code includes a client process for participating in a mutual challenge-response authentication protocol, the client process comprising:

means for indicating to a server process a requirement for an operation to be performed, thereby prompting the server process to generate and send a server challenge to the client process;

means for applying a cipher function to the client's password to generate a cipher-protected client password;

means, responsive to receipt of the server challenge, for generating a client response and counter-challenge, the client response and counter-challenge including a message authentication code computed using the cipher-protected client password;

means for forwarding the client response and counter-challenge to the server process, thereby to prompt the server process to:

- (i) receive the client response and counter-challenge;
- (ii) access a repository storing a cipher-protected client password, generated by applying said cipher function to the client's password, to retrieve said stored cipher-protected client password;
- (iii) generate, using said stored cipher-protected client password, a message authentication code corresponding to an anticipated client response and counter-challenge;
- (iv) compare the received and generated message authentication codes to determine whether they match and, responsive to a match, to generate a server response to the client response and counter-challenge and to forward the server response to the client process;

wherein the client process also includes:

means for generating a message authentication code corresponding to an anticipated server response,

means for receiving the forwarded server response, and

means for comparing the forwarded and anticipated server responses to determine whether they match,

wherein the client process for participating in a mutual challenge-response authentication protocol is adapted to be performed without having the client password in a cleartext format on the server data processing system, and

wherein the program product is adapted to function without additional software infrastructure.

15. (Currently Amended) A data processing system including:

a repository storing a cipher-protected copy of client passwords, the cipher-protected client passwords having been generated by applying a first cipher function; and

a server process for participating in a mutual challenge-response authentication protocol with a client process having an associated client password, the server process comprising:

means, responsive to a client process indicating a requirement for an operation to be performed, for generating a server challenge and for transmitting the server challenge to the client process, thereby to enable the client process:

(i) to generate a cipher-protected client password by applying said first cipher function to the client's password, thereby to provide the client and server processes with a shared secret; and then

(ii) to generate a client response and counter-challenge, the client response and counter-challenge including a message authentication code computed using the cipher-protected client password, and to forward it to the server process;

means for receiving the client response and counter-challenge from the client process;

means for accessing the repository and retrieving said stored cipher-protected client password;

means for generating, using said stored cipher-protected client password, a message authentication code corresponding to an anticipated client response and counter-challenge, and

for comparing the received and generated message authentication codes to determine whether they match;

means, responsive to a match, for generating a server response to the client response and counter-challenge; and

means for forwarding the server response to the client process to enable the client process to perform an authentication check,

wherein the data processing system is adapted to function without having the client password in a cleartext format on the server data processing system, and

wherein the data processing system is adapted to function without additional software infrastructure.

16. (Original) A distributed data processing system comprising a first data processing system according to claim 14 and a client data processing system, the client data processing system including a client process for:

generating a cipher-protected client password by applying said first cipher function to the client's password, thereby to provide the client and server processes with a shared secret;

generating a client response and counter-challenge to the server challenge, the client response and counter-challenge including a message authentication code computed using the cipher-protected client password;

forwarding the client response and counter-challenge to the server process;

receiving the forwarded server response;

generating an anticipated server response and comparing the received and anticipated server responses to determine whether they match; and

in response to a positive match, confirming successful authentication.

### **III. REMARKS**

Claims 1-16 are pending in this application. By this amendment, claims 1, 3, 10 and 12-15 have been amended. These amendments are being made to facilitate early allowance of the presently claimed subject matter. Applicants do not acquiesce in the correctness of the rejections and reserve the right to present specific arguments regarding any rejected claims not specifically addressed. Further, Applicants reserve the right to pursue the full scope of the subject matter of the original claims in a subsequent patent application that claims priority to the instant application. Reconsideration in view of the following remarks is respectfully requested.

Entry of this Amendment is proper under 37 C.F.R. 1.116(b) because the Amendment: (a) places the application in condition for allowance as discussed below; (b) does not raise any new issues requiring further search and/or consideration; and (c) places the application in better form for appeal. Accordingly, Applicants respectfully request entry of this Amendment.

In the Office Action, claims 1-3, 6-8 and 12-16 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Davis *et al.* (U.S. Patent No. 6,064,736), hereafter “Davis,” in view of Olkin *et al.* (U.S. Patent Pub. No. 2003/0046533), hereafter “Olkin.” Claims 4, 5, 9, 10 and 11 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Davis in view of Olkin, and further in view of Yatsukawa (U.S. Patent No. 6,148,404), hereafter “Yatsukawa.”

#### **A. REJECTION OF CLAIMS 1-3, 6-8 and 12-16 UNDER 35 U.S.C. §103(a) OVER DAVIS IN VIEW OF OLKIN**

With regard to the 35 U.S.C. §103(a) rejection over Davis in view of Olkin, Applicants assert that the references cited by the Office do not teach or suggest each and every feature of the claimed invention. For example, with respect to independent claims 1 and 12-15, Applicants